Experience in a Bottle: How Boeing Captured its Assessment Best Practices

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How do you "bottle" the years of experience from your hot project teams? These might be an emergency review of a critical information system (IS), assessments of potential suppliers, or evaluation of IS organizations. This article describes how Boeing captured and used tailorable best practices and ended up creating a companywide Web site, the Structured Review Process (SRP).

The Age-Old Problem: Starting From Scratch

How many times have you been part of this scenario: Your boss informs you that Alpha Team has been formed to review (assess or audit) a development project for a new information system, named Critical. It has to be done in four weeks. The project is essential to the company and the new chief information officer (CIO) wants to know if Critical will be done on time. Also, the CIO wants assurance that the project is managed properly and if Critical can be used in other divisions of the company. You have been selected as the team project manager.

If you are like most other teams of this type, you get everyone together, try to decide exactly what it is you are supposed to do, then start doing it. This is an all-star team, but how you do the review is up in the air. Your team develops a new process, complete with its own deliverables. Then, like a development project, you start coding, in a manner of speaking. After all, you only have four weeks to complete the review.

If you are lucky, your organization has a standard process for conducting assessments. The process is documented, repeatable, and has all those other favorable characteristics so well described by the Software Engineering Institute in its software Capability Maturity Model (CMM®). But this is not your lucky day.

What happens when Alpha Team is done? Who takes time to document the lessons learned, collect deliverable examples, and document the process for future teams? Probably no one. After all, there is real work to be done and it has stacked up for four weeks while the team has conducted the review.

Teams, Teams Everywhere

Boeing has more than 200,000 employees and there are always dozens of teams working on important, time-critical projects. Several recent projects in Commercial Airplane Information Systems have assessed the ability of potential foreign suppliers to perform computing work for Boeing. That is how the SRP Web site got started. The general areas of work included Y2K, porting of engineering applications to new platforms, and business system maintenance.

The history of this process goes back to 1997 when a 12-member multi-discipline team formed to assess suppliers in Elbonia (the name we will use in honor of Dilbert, our favorite software engineer). The review had to be done quickly, and the sponsors left it to the team as to how to do the review. Most of the team members had never done an assessment, so they looked for help. Fortunately, some of the members were familiar with the CMM. Boeing had adopted the CMM for division software process improvement activities and had several years' experience conducting CMM assessments. The team used the general CMM approach of using a questionnaire, conducting interviews, and identifying actions. The CMM was a key source of questions for the project management and software process maturity sections of the questionnaire.

Team members completed the assessment on time, received an award, and returned to their regular jobs.

Fortunately, the team project manager carefully archived the process description developed by the team, including deliverable templates and samples, some lessons learned, and related documentation. This step was fortunate because in a few months came another hot project — assessment of foreign suppliers in Monrovia. This time the companies would not be interviewed in depth by a team of assessors, but visited by two managers for half-day reviews.

One of the managers happened to know about the Elbonia assessment and asked if its process could be tailored for the next assessment. The answer was an immediate "yes." The process was quickly modified for this scaled-down assessment and the managers flew to Monrovia and completed their review in a few short days. Reuse had started.

A few months later another hot project beckoned — review of a development project, the Dogbert system. Dogbert was extremely important because it supported a new Boeing product that was about to be released. Late products mean unhappy customers and Boeing does not like unhappy customers.

By now the usual suspects in the form of team members were called again. This was the third time in a year that two team members were asked to drop everything they were doing and help on a rush job. By using the documented Elbonia and Monrovia experiences, the Dogbert team had a process defined, deliverables understood, and a good start on a questionnaire.

The Capability Maturity Model and CMM are registered in the U.S. Patent and Trademark Office.

Subject Matter Expert: Mary Preston		Manager Responsible for Resolving Issue: Robert Notse		
Topic	Software Process Maturity (see questionnaire)			
Issue	Lack of software life cycle methodology			
Health	Red	**Yellow**	Green	Gold	
Risk	Showstopper	Critical Watch	**High Risk**	Latent Risk	Opportunity
Notes	The Dogbert Project team does not use a common repeatable, documented software development methodology. There is a company standard, but it has not been used by this team. As a result, key deliverables are missing, such as a current project plan, team roles and responsibilities, change requests, and outstanding issues. The assessment team recommends using the company standard immediately and preparing the key missing deliverables. Otherwise the project has a high risk of failure and will probably miss its key milestone dates.			
Estimated Completion Date	December 12, 1999			

Figure 1. *Example Dogbert review issue/problem rating template.*

Process Improvements

The Dogbert team did something very different from the previous teams — it changed the rules of how interviews were conducted. This proved to be the most important lesson learned in the review. When CMM assessors, auditors, and others conduct interviews, they usually do not identify the source of their findings (a person's name). The Dogbert team agreed to not only identify the subject matter expert for each issue, but also identify the manager responsible for resolving the issue. The review team and the people interviewed jointly crafted definitions of findings, issues, and due dates. They had to agree on the wording of the topic and corresponding issue, and its health and risk ratings. Technology was a big help with the use of a laptop and portable projector to show the findings on-screen. Figure 1 is an example of the template used to document issues, problems, and other findings, including positive ones.

Another process improvement the Dogbert team made was to define both health and risk ratings for the project. Health ratings are shown in Figure 2. Health ratings, in stoplight format, indicate whether there are major issues to be addressed and how well the activities are progressing per the schedule. Risk ratings have familiar titles such as showstopper, critical watch, high risk, latent risk, and opportunity. See Figure 3 for some examples. Risk ratings reflected impacts on the system and the customer if a problem was not resolved. Use of both ratings gave a clearer idea of the possible pitfalls for the IS project.

In addition to the commonly used red, yellow, and green ratings, the team added a gold rating. This process improvement proved to be invaluable since it recognized what was being done right. When the team presented its findings, the gold category was the first one discussed and it helped put the review in a positive frame of mind. After all, how often does a review recognize the positive things a project team is doing?

The Dogbert team successfully finished its review, received an award, and returned to work. But three of the team members realized the need to do something more than archive results from another review. The Dogbert team sponsor also recognized the need to "bottle" the team's experiences. The SRP Web site was about to be born.

The Boeing Intranet and the SRP

The Dogbert team created more than 100 electronic files containing everything from deliverable examples, presentations, and process descriptions, to intermediate deliverables, and more. In addition, there were the previous files from the Elbonia

Figure 2. *Dogbert review health rating criteria.*

Rating	Meaning	Criteria
RED	Not Acceptable	Unsatisfactory condition, or • There is an impact to the plan, commitments are not being met. • The end-item schedule and deliverable will not be met. • Required plans are not yet developed (no plan).
YELLOW	Partially Acceptable	Marginal condition, or • Concerns and/or a potential situation exists that may impact the plan deliverable. • Original commitment is in jeopardy and elements of the plan are not being met. • The end-item schedule and deliverable are at risk.
GREEN	Acceptable	Satisfactory condition, or • A customer-agreed-to plan consisting of a work statement, deliverables, and a schedule is in place with all activities authorized. • Commitments are being met and there are no anticipated problems.
GOLD	Noteworthy Status	Well done. Meets or exceeds expectations.

Category	Criteria
Showstopper	The system will • Not work. • Not be able to maintain an acceptable level of performance. • Create unacceptable downtime. • Create unacceptable data integrity errors.
High Risk	The system will • Require a high support effort. • Significantly degrade response and restoration time.
Opportunity	Opportunities for continuous quality improvement will lead to improvements and will not cause problems.

Figure 3. *Dogbert review risk rating criteria (selected ratings).*

and Monrovia reviews scattered about.

After the Dogbert review was done, three team members met to figure out how to capture all of this valuable material. Over the next few weeks several options were reviewed, but one emerged over the others — create a new Web site on the Boeing Intranet. All three team members had used the world-famous Boeing web and one of the members was responsible for several software engineering Web sites. They agreed to develop it in their spare time.

All the pieces came together, including a web developer who was between projects. The SRP site began in the fall of 1998 and within a couple of months the initial site was done. The site was not fancy and the material was basic, but it represented a collection of best practices that could be used by anyone doing reviews, assessments, or audits of projects, organizations, or suppliers. In fact, it could be used for just about any type of review even though the primary audience was software engineering practitioners.

The Production SRP Site

The site has evolved to one with more than 100 deliverable examples, lessons learned, and related links. The home page describes the general categories of IS reviews for which the site was built:
• assessment of suppliers of software products and services
• system production readiness
• project management of the IS project
• technical oversight and architecture for the system

The review steps are basically the same whether you are reviewing an IS project or conducting other types of reviews. The navigation bar shown in Figure 4 lets the user go directly to any one of 15 steps in a review, look at deliverable examples for each step, select a boilerplate (template) for the deliverables, read the lessons learned for each step, or go to links to relevant Boeing and external Web sites.

Internal web links include Offshore Computing Support (they assess suppliers), production readiness reviews, computer disaster preparedness, sites for assessors, and other sites with tools or information of value to reviewers.

The Software Program Manager's Network is a popular external link, since it has free guidebooks invaluable for anyone conducting reviews: *Project Breathalyzer* (how to get a quick look at project health), *The Book of Software Management Questions* (good for program managers to understand what makes projects successful), and *The Little Book of Bad Excuses* (common excuses you hear from people being reviewed). There are more guides and all are free via the web.

One of the benefits of the site is that it allows a user to enter at any point in

Figure 4. *Key index page for SRP Web site.*

SWE Home	Search | Site Map | Support | Feedback
Structured Review Home	Steps | Lessons Learned | Examples | Boilerplates | Related Links

Structured Review Process

The general steps for a structured review are listed below. You can use these steps as starting points while developing your own review process.

Startup	1. Identify Need and Sponsorship
	2. Define the Scope
	3. Form the Team
	4. Assign the Team Project Manager
	5. Tailor the Review Process
Data Gathering	6. Obtain Background Information
	7. Develop the Questionnaire
	8. Conduct the Kickoff Meeting
	9. Distribute the Questionnaire
	10. Analyze the Questionnaire Results
	11. Prepare for Site Visits
	12. Conduct Group Interviews
Reporting	13. Prepare the Final Report
	14. Present the Findings
	15. Wrap up the Review

the review process. For example, a team may have been formed, but it needs help developing a questionnaire. Team members can go directly to Step 7, Develop the Questionnaire, to see how others have done this step. They could reuse many parts of the questionnaire template or they can view lessons learned from other reviews.

If a review team has just been formed, it can tailor the 15-step process to meet its needs. For example, it may not do a questionnaire and will only conduct interviews. The team can eliminate the unneeded steps to come up with its own process. A CMM assessor could use the site to complement the guidance from SEI since the questionnaire exists. The "how to" steps are included in the SRP site and help any reviewer, experienced or new.

Early Results

Since the site went into production it has been used in several successful reviews. In one case — another foreign supplier assessment — the review flow time was cut in half due to the use of reusable processes and deliverables. The team met a tight schedule even though many of the team members were called away on other special assignments.

In another case — review of an IS organization — the site was used to develop the review process and identify deliverables. Again, hundreds of hours were saved due to reuse. In a third case, the SRP site was used to develop a process to conduct reviews of potential suppliers of computing services. Savings in time, cost, and schedule were considerable without sacrificing quality.

Next Steps

Many additions are being made to the Web site, including more examples, boilerplates, lessons learned, and links. A new category, Tools, will be added since there

are a number of commercial and in-house tools that help reviewers. The site has had rave reviews throughout the company and communications about SRP will continue in the form of presentations, news articles, and other means. Several Boeing divisions are using the site.

Conclusion

Without the SRP site, many review teams would have continued reinventing processes for IS reviews. But now there is an alternative to starting from scratch. The SRP site has captured years of experience in the form of reusable, tailorable processes, deliverables, and tools. Creating the SRP site took minimal effort and was completed in two months. The benefits are still coming in, far exceeding the initial investment. The site will continue to be improved as experiences from future reviews are added. ◆

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